

COMMUNITY ENERGY PLANNING, STAGE 1

Fort Chipewyan, Alberta

Prepared for:

**Remote Community Demonstration Program
Energy, Mines and Resources Canada**

Prepared by:

**Arctech Community Energy Research Associates
Whitehorse, Yukon**

January 1984

RDCP/PDCE-13

Under the Remote Community Demonstration Program of Energy, Mines and Resources Canada (EMR), EMR is making this report available. However, distribution of this report by EMR does not necessarily signify that the contents reflect the views and policies of EMR. Mention of trade names and commercial products does not constitute recommendation or endorsement for use.

COMMUNITY ENERGY PLANNING, STAGE 1

FORT CHIPEWYAN, ALBERTA

by Arctech Community Energy Research Associates

Energy Conservation Options

1. Rationale and Objectives

This report documents potential elements of an energy conservation program designed to reduce the dependence upon oil for space heating and electricity generation in Fort Chipewyan, Alberta. The work was accomplished through a site visit to Fort Chipewyan and meetings with community representatives and government agencies, to document environmentally, technically, and socially feasible approaches to such a program.

The following outline comprises the work statement for the first stage of a study for Fort Chipewyan as part of the Remote Community Demonstration Program of Energy, Mines and Resources Canada.

- * Establish liaison with representatives of organizations associated with the supply, use and payment of energy used in Fort Chipewyan, eg. Alberta Power, DIAND, community leaders in Fort Chipewyan, Social Services (Canada, Alberta).
- * Focus on ways in which the impact of constraints (home ownership and energy costs) may be lessened to enhance the success of energy conservation demonstrations.
- * Itemize potential options for energy conservation in Fort Chipewyan, as well as factors which affect implementation of these options.
- * Integrate the preceding energy conservation options into the existing community planning structure of Fort Chipewyan.
- * Recommend the most feasible alternatives to be used to overcome these constraints, to ensure the success of an energy conservation program in Fort Chipewyan.

The study began in the first week of November 1983, with a community visit to Fort Chipewyan. Representatives of the EMR Conservation and Renewable Energy Office in St. Albert, and Arctech Community Energy Research Associates in Whitehorse, Yukon, spent four days in the community. During this time, the study team met with community representatives to assess their needs and interests relating to energy conservation. Fort Chipewyan, with an estimated population of 1,600, was chosen for this study because it is the largest remote community in Alberta. As well, the opportunities and problems associated with energy supply and energy conservation in Fort Chipewyan are typical of many other remote communities in Northern Canada.

2. Background

A. Economic

Fort Chipewyan is a troubled community. It is reported that the damming of the Peace River significantly altered the habitat of fur-bearing animals in the Delta; trapping is no longer a viable industry. The dam and the upstream industrial activity have also affected the fishing in Lake Athabasca. Caribou migration through the area ceased in the 50's; local opinion attributes this to intervention by government game management practices. Game is scarce and only a few families can hunt in the adjacent Wood Buffalo National Park. There are ongoing efforts by a few members of the community to establish a tourist-based industry to utilize the park environment. However, the lack of southern standard tourist accommodation has limited this effort.

B. Existing Community Services

The diesel-fueled generation facility in Fort Chipewyan supplies electricity to approximately 260 residential dwellings. Primary space heating is provided by wood to approximately 134 residences, by oil to approximately 105 residences, and by propane to approximately 21 residences. Water and sewer services to nearly all of the residences are presently nearing completion; however, most of the residences do not yet have the plumbing facilities to utilize this service.

C. Education

Local persons have been unable to meet educational requirements for entrance into apprenticeship programs at Fort MacMurray. Keyano College is located in Fort MacMurray with an extension service in Fort Chipewyan, which offers educational upgrading and life skills development. Formalized education is not held in high esteem; one teacher indicated that attendance at the local school generally runs at about 50%. Other individuals indicated that persons who attempt to upgrade themselves educationally are denigrated by their peers within the community. Some members of the community send their children to attend high school in Edmonton.

D. Construction Industry

While the functional elements of a localized construction industry do exist, it has been difficult to gain organized co-operation under a unified management. In discussions with an Indian Affairs representative in Edmonton, it was indicated that management problems with both Chipewyan and Cree Bands made it difficult for the Bands to build their own housing. Recent Band housing has been built by outside contractors who do not hire local persons with carpentry experience. A great deal of concern was expressed by administrators from both Bands, who felt that training in energy conserving construction techniques for Band members would help to alleviate this problem. Both bands want to build their own housing, and indicated that the type of training which Arctech has developed in the Yukon may well work in Fort Chipewyan.

E. Housing

i. Background

Most of the housing in Fort Chipewyan is in a deteriorated condition. This can be attributed to an inappropriate choice of building style, building materials, and construction techniques, which do not match the traditional lifestyles of the people nor the climate of the region. The native people traditionally practised a semi-nomadic lifestyle, relying heavily on the productivity of the Athabasca Delta. Small log cabins were built at traditional camp locations in the Delta. By the time the immediate wood supply was depleted, the bottom logs of the cabin had rotted from exposure to the moist soil, so the people moved a short distance away and built another cabin. A tradition of permanent housing is not ingrained in the culture. It is difficult or impossible to own land in the community. This factor, in combination with the government practice of providing housing, has made it difficult for the natives to assimilate the southern cultural values of land and house ownership, although a desire to own these does exist.

ii. Impact of Lifestyle

The control of moisture and condensation in the houses is a recurrent problem, since the traditional native cooking style relies heavily on boiling as the primary method of food preparation. This did not create problems in the log cabins, since even the tightest log structure can transmit moisture through the wood. However, when the people were relocated into mobile homes and plywood cabins, this traditional practice caused excessive moisture build-up behind impermeable exterior sheathing. This causes accelerated dry rot in the building structure, and rapid degradation of the buildings.

iii. Geographical Impact

The terrain of the area is a combination of bare rock, sand and muskeg with a high probability of discontinuous permafrost. In many cases, foundation instability has contributed to the structural degradation of the buildings.

iv. Impact of Building Practices

Common building practice does not provide for a continuous, well sealed, vapour barrier. If houses were constructed to current energy conserving standards, and vapour barrier integrity was attained, then condensation on windows would be severe, unless mechanical or natural ventilation was provided. However, the reliable operation of any mechanical system in remote community housing is a continuing problem. It will be easier and more ethical to develop simple building designs which can accommodate the lifestyle of the people, rather than trying to change cooking practices. The DIAND representative indicated that the department does not expect its housing to have more than a ten-year lifetime.

3. Data Collection

A. Objectives

A specific objective of this visit to Fort Chipewyan was to determine the extent of energy cost subsidies within the community to gain a better understanding of incentives and disincentives to energy conservation. To understand the factors contributing to the potential for energy conservation, questions were addressed to community members to determine who owns the houses and who pays for fuel and utilities. The data gathered during this visit should be considered an approximation.

B. Housing Administration

About 34 residences are privately owned. The Cree Band administers 113 residences, and the Chipewyan Band administers 38 residences. These houses are owned by the federal government, and held in trust and maintained by the Bands.

Alberta Housing and Public Works (AHPW) owns and maintains: 11 residences for provincial government staff; 10 residences for Metis; and 31 units for the Rural Mobile Home Program. An additional 4 AHPW units will be dismantled next year since they do not meet the requirements for water and sewer connections. Another 20 residences are owned and maintained by a variety of agencies including the Northlands School District, the Federal Government (RCMP, MOT, Parks, NHW, DIAND - Bishop Piche School), the Hudson's Bay Co., and Alberta Power.

C. Subsidies and Grant Programs

Residents of the 20 agency houses and the provincial government staff houses either pay no rent, fuel or utilities, or pay a fixed monthly rate. It is significant that these 31 households comprise 12% of the community residences, and that residents of these houses hold some of the most respected positions in the community. Their example may imply that energy subsidies are a "way of life" in the community.

Indian Affairs Social Assistance records indicate that during winter 82-83, 61 Cree and Chipewyan households were obtaining vouchers for fuel. From these data, it can be estimated that last winter, 35% of the households in the community received government energy subsidies which provided no financial incentive to conserve. More significantly, one third of the subsidized households were those of federal government professionals. Indian Affairs provides an additional 12 families with continuing grants which they budget for themselves. A fixed amount of social assistance is also provided in the community. With the exception of food vouchers, these people budget their own funds for energy and other expenses. Last winter 38 households received this form of provincial assistance. Households which receive continuing grants from Indian Affairs, and those households which receive social assistance from the provincial government, have the same incentive to conserve fuel oil and electricity as those households which do not receive financial assistance for energy payments.

Alberta Utilities and Telephones manages a rebate program which compensates applicants for the energy price difference between fuel oil and natural gas. This rebate program may act as a disincentive to energy conservation; however, if applicants were encouraged to use the rebate for thermally upgrading their houses, conservation would become a valid option to consider.

4. Community Interest

During this community visit, the concerns and priorities of residents were sought; emphasis was placed on those factors which relate to energy, as well as general attitudes in the community. Individuals contacted included homeowners, business persons, teachers, social workers, members of Town Council and Band Councils, the RCMP, engineering consultants, and community service organizations. The limited time available for visits necessitated that most of the effort was directed towards obtaining the opinions of community leaders and innovators. The nature of small communities also dictated that the "average" person in the community is unlikely to be expressing opinions to "outsiders". It wasn't until the fourth day of the visit that people on the street would acknowledge recognition and stop for a chat about the weather.

5. Energy Conservation/Alternate Energy Options

A number of project ideas were expressed in the meetings with community members. These included:

- * specific training and skills upgrading for energy conserving construction so that people can build their own houses and apply energy conserving retrofits;
- * waste heat recovery from the power plant for water system heating, or space heating in the new school, or community buildings;
- * more efficient wood-fired heating systems and the use of chip wood; and

* a propane-fueled electricity generation and a propane vapour distribution system.

These ideas, and others which may arise in community meetings, should be discussed and prioritized into a proposal from the community. At this time, it is feasible to respond to a strong community need for energy conservation information and to further assess the viability of more extensive programs within a context of a greater community awareness.

6. Recommendations

A. Information Transfer

Many people in the community expressed a desire for information presentations which would address the problems of discomfort in the houses caused by excessive air leakage and poor insulation. A few people have used styrofoam as an insulating sheathing in an attempt to increase the thermal integrity of the house. With the severity of the climate, it is likely that consideration will occur on the inside of the styrofoam, be trapped by the impermeable styrofoam and contribute to accelerated degradation due to dry rot. Similar circumstances may occur if additional insulation is placed in attics without first sealing moisture leaks from the rooms below. With information on the relative economics of fibreglass and styrofoam, as well as the necessity of a warm, continuous, air-vapour barrier, householders may be able to significantly improve the comfort and useful lifetime of buildings in Fort Chipewyan.

As well, information and materials application demonstrations of cost-effective and durable weatherstripping and air sealing techniques would be of benefit. It is also important for energy awareness to be introduced to the younger people in an entertaining format, since the undisciplined curiosity of children provides an opportunity to create an interest in conservation at a young age.

Some residents have attempted to reduce heat loss by stapling polyethylene on the outside of windows. This is not as effective as interior application, and in some cases can cause additional problems with trapped moisture. With the recent introduction of waste and sewer service, it is likely that many electric hot water heaters will be installed. This will significantly increase the demand for electricity and oil for power generation. At the user level, this increased demand will likely exceed 500 kWh per month per household. At present energy costs, the household will pay three times as much for electric hot water then propane fired hot water. Information such as this, combined with an understanding of electricity billing policy and basic information on water conservation, may also benefit the community.

It is recommended that a series of evening seminars and Saturday or weekday workshop demonstrations of simple low-cost/no-cost energy conservation techniques be presented in the community this winter. In addition to providing a forum for information transfer, this may also initiate an awareness of energy use in the community, and provide a focus for the generation of a community based proposal to RCDP for additional training or demonstration projects. If Arctech provides the curriculum and delivery for these seminars and workshops, then the opportunity would exist to assist the community in the development of a proposal.

B. Community Energy Profile

It is further suggested that a more detailed community energy profile be developed for Fort Chipewyan. Such a profile would aggregate and assess the validity of earlier reports relating to housing in the community as well as establishing building specific energy consumption and energy use efficiencies for each building. All buildings for which fuel and electricity records are available would be assessed on a kilojoules per cubic meter per degree day basis, and a retrofit potential would be determined. Anomalous buildings would be given a detailed survey with the co-operation of the occupants.

It is suggested that a minimum of two weeks this winter be devoted to the implementation of an energy awareness program, specifically tailored to the requirements of the people in Fort Chipewyan. This program would consist of information transfer and liaison with the community for the preparation of proposals from the community to EMR.

PROGRAMME ENERGETIQUE POUR LA COLLECTIVITE, PREMIERE ETAPE
FORT CHIPEWYAN (Alberta)

Résumé pour la direction

Le rapport contient une étude d'éléments susceptibles de s'inscrire dans un programme d'économies d'énergie visant à réduire la dépendance à l'égard du mazout pour le chauffage et la production d'électricité dans la collectivité de Fort Chipewyan (Alberta).

La génératrice diesel de Fort Chipewyan fournit de l'électricité à quelque 260 logements résidentiels. Les principaux combustibles utilisés pour le chauffage résidentiel sont le bois (environ 134 maisons), le mazout (environ 105 maisons) et le propane (environ 21 maisons). La construction des systèmes d'adduction et d'égout destinés à desservir presque toutes les maisons sera bientôt terminée; toutefois, la plupart des maisons n'ont pas encore la tuyauterie nécessaire pour profiter de ces services.

A Fort Chipewyan, la plupart des maisons sont en très mauvais état. Cette détérioration peut être attribuable au choix de type, de matériaux et de méthodes de construction qui ne conviennent ni au mode de vie traditionnel des autochtones ni au climat de la région.

L'étude visait, entre autres objectifs, à déterminer l'importance des subventions au titre de l'énergie dans la collectivité, afin de mieux comprendre les facteurs qui favorisent ou empêchent l'économie d'énergie.

Les occupants des 31 maisons administrées par divers organismes fédéral, provincial et commercial n'ont rien à payer au titre du loyer, du combustible consommé ou des services publics, où ils doivent verser un montant mensuel fixe. Les dossiers des services d'assistance sociale du ministère des Affaires indiennes et du Nord révèlent que 61 ménages cris et chipewyans recevaient des bons pour l'achat de combustible au cours de l'hiver de 1982-83.

Au moyen de ces données, nous pouvons estimer que, l'hiver dernier, 35 % des ménages de la collectivité ont reçu des subventions qui ne renfermaient aucune incitation financière à économiser l'énergie.

L'Alberta Utilities and Telephones administre un programme de remboursement servant à indemniser les abonnés en raison de l'écart des prix entre le mazout et le gaz naturel. Ce programme peut avoir pour effet de réquie l'incitation à économiser l'énergie; toutefois, si les intéressés étaient incités à utiliser le remboursement pour améliorer le rendement énergétique de leur maison, l'économie d'énergie deviendrait une mesure avantageuse.

Au cours des entretiens avec les membres de la collectivité, un certain nombre de projets ont été proposés, par exemple, des cours de formation et de perfectionnement se rapportant aux techniques de construction qui permettent d'économiser l'énergie, afin que les résidents puissent construire leur propre maison et utiliser les techniques de réfection qui permettent d'améliorer le rendement énergétique.

En conclusion, il y a lieu de répondre à la forte demande d'information de la collectivité au sujet des mesures d'économies d'énergie et d'évaluer davantage la viabilité des programmes plus étendus, une fois que la collectivité sera mieux renseignée.

Il est recommandé d'organiser, au cours de l'hiver, une série de soirées-causeries et d'ateliers présentés le samedi ou durant les jours de semaine, pour expliquer et démontrer des techniques simples et peu coûteuses ou gratuites qui permettent d'économiser l'énergie.

Il est également proposé de dresser un profil énergétique plus détaillé pour la collectivité de Fort Chipewyan. Ce profil servirait à rassembler et à évaluer les rapports antérieurs sur le logement dans la collectivité ainsi qu'à préciser, pour chaque immeuble, le niveau de consommation d'énergie et le rendement énergétique.

Cette étude a été effectuée par Arctech Community Energy Research Associates, sous le Programme de démonstration dans les collectivités éloignées d'Énergie, Mines et Ressources Canada.

